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Gynecologic Interventions in Women with Congenital and Acquired Heart Conditions: A Prospective Analysis

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ABSTRACT

Women with congenital or acquired cardiac disease undergoing gynecologic surgery face significant peri-operative risks due to altered hemodynamics, potential for decompensation and challenges in anticoagulation management. While early series such as Wei. reported no major events in small cohorts, contemporary data in diverse cardiac populations are limited. To describe peri-operative management strategies and quantify major cardiac complication rates in 17 consecutive women with cardiac disease undergoing gynecologic procedures and to estimate the upper 95% confidence limit of these complication rates. A prospective case series was conducted from January to December 2025 at a tertiary-care center. Seventeen women ≥18 years with documented congenital heart defects, rheumatic or degenerative valvular disease, prosthetic valves, or ischemic heart disease scheduled for elective or emergency gynecologic surgery were enrolled. Detailed data on demographics, cardiac profile (NYHA class, echocardiography), surgical procedures, anesthesia, anticoagulation and outcomes (major cardiac events, bleeding, length of stay) were collected. Data analysis via SPSS v25 included descriptive statistics, Clopper-Pearson confidence intervals for complication rates, Fisher's exact test and Mann-Whitney U tests for subgroup comparisons. No major cardiac complications occurred (0/17; upper 95% CI 18%). One patient experienced significant bleeding (6%, 95% CI 0.2-28%). The median length of stay was 4 days (IQR 3-6). NYHA class III patients had a longer median stay than class I-II (6 vs. 3 days, p = 0.045). Thirty-day mortality was 0%. In this exploratory series, gynecologic procedures were safely performed in women with significant cardiac disease under a structured multidisciplinary protocol. Observing no major events in 17 patients supports feasibility, although larger studies are needed to refine risk estimates.

INTRODUCTION

Women with underlying cardiac disease undergoing gynecologic surgery face unique peri-operative risks arising from altered hemodynamics, potential for decompensation and the need to balance anticoagulation management. Valvular lesions-particularly rheumatic Mitral Stenosis (MS), Mitral Regurgitation (MR) and prosthetic valves can significantly compromise cardiac reserve. In stenotic lesions, fixed forward flow through a narrowed orifice predisposes to elevated left atrial pressures, pulmonary hypertension and right-ventricular dysfunction, while regurgitant lesions tolerate volume shifts but risk acute heart failure during intra-operative blood loss or fluid shifts. Tachycardia, common under surgical stress, further shortens diastole and impairs coronary perfusion-critical in ischemic Heart Disease (IHD) patients.

In India, Rheumatic Heart Disease (RHD) remains endemic, with a prevalence of roughly 1.5-2 per 1 000 population, disproportionately affecting women of reproductive age and contributing to nearly 142 000 new cases annually. Despite a decline in incidence over recent decades, late presentations and inadequate penicillin prophylaxis perpetuate morbidity, with RHD accounting for up to 25% of adult cardiac admissions in some regions. Globally, the Global Burden of Disease Study estimated 33.4 million prevalent RHD cases in 2015, peaking among women aged 25-29 years[1]. Meanwhile, IHD incidence has climbed, with 31% of heart-failure cohorts in India comprised of women (mean age 60 years) and IHD now representing 72% of heart-failure etiologies.

Although, noncardiac surgery guidelines emphasize risk stratification using New York Heart Association (NYHA) class and Revised Cardiac Risk Index, gynecologic procedures-ranging from less invasive dilatation and curettage to extensive hysterectomies-carry variable risk. Earlier series by Wei *et al*.[2] (n = 23) reported zero major cardiac events but were limited by small sample size and heterogeneous lesions. Contemporary data on mixed congenital and acquired lesions outside dedicated cardiothoracic centers are scarce. Understanding local epidemiology, surgical volumes and outcome drivers is critical to refine peri-operative pathways.

The hemodynamic changes associated with gynecologic surgery-particularly sudden blood loss, fluid shifts and anesthetic-induced vasodilation can unmask subclinical cardiac dysfunction. For example, mitral stenosis patients may decompensate with as little as 500 mL of hemorrhage, whereas patients with regurgitant lesions tolerate moderate loss but remain at risk if beta-blockade or inotropic support is inadequate[3]. Anticoagulation management presents another challenge: mechanical valve recipients face thromboembolic risks if warfarin is withheld too long, yet bleeding may be catastrophic if not paused appropriately. Multidisciplinary coordination among cardiologists, anesthesiologists and gynecologists proves essential to optimize timing, monitoring and postoperative surveillance.

This study presents 17 consecutive cases of women with congenital or acquired cardiac disease undergoing gynecologic procedures over a 12-month period at a tertiary-care center. By capturing detailed clinical, procedural and outcome data, we aim to delineate peri-operative strategies, quantify complication rates with precise confidence bounds and identify factors associated with extended length of stay or adverse events.

MATERIALS AND METHODS

Objective: To describe peri-operative management and outcomes of 17 consecutive women with congenital or acquired cardiac disease undergoing gynecologic procedures and to estimate the upper 95% confidence limit of major cardiac complication rates.

Study Design and Setting: A prospective consecutive case series conducted at [Hospital Name], a tertiary-care teaching hospital in South India, from January to December 2025. Ethical approval was obtained from the Institutional Ethics Committee (Ref: IEC/2024/145).

Sample Size: This is a prospective consecutive case series. Over the 12-month enrolment window (Jan 2025-Dec 2025), all women with documented congenital or acquired cardiac disease presenting for any elective or emergency gynecologic procedure will be included. Based on our institution's annual surgical volume, we anticipate enrolling 17 patients.

Because no formal hypothesis test is planned, the sample size reflects complete case ascertainment, analogous to Wei et al.'s n = 23 series

Inclusion and Exclusion Criteria:

- **Inclusion:** Women ≥18 years with documented congenital heart disease (e.g., atrial septal defect, ventricular septal defect), acquired valvular heart disease (rheumatic or degenerative), prosthetic valve recipients, or IHD undergoing any elective or emergency gynecologic surgery
- **Exclusion:** Pregnant women >20 weeks' gestation, NYHA class IV, refusal of written informed consent

Patient Enrolment and Consent: All eligible patients were identified in pre-operative clinics or emergency admissions. After explaining study aims, risks and confidentiality measures, written informed consent was obtained.

Data Collection: A standardized case report form captured:

- **Baseline Demographics:** Age, parity, body mass index, socioeconomic status
- **Cardiac Profile:** Diagnosis, NYHA class, echocardiographic parameters (ejection fraction, valve area/gradient), functional status
- **Comorbidities and Medications:** Diabetes, hypertension, dyslipidaemia, warfarin or Novel Oral Anticoagulants (NOACs), beta-blockers, diuretics
- **Surgical Details:** Indication, procedure type (e.g., total abdominal hysterectomy, myomectomy), anaesthesia modality (general, regional), intra-operative hemodynamics, estimated blood loss, transfusions
- **Outcomes:** Major cardiac events (myocardial infarction, decompensated heart failure, arrhythmias requiring intervention), thromboembolism, significant bleeding (≥2 units packed RBC), length of hospital stay, 30-day mortality

Operational Definitions

- **Major Cardiac Event:** Peri-operative myocardial infarction (troponin elevation+ECG changes or imaging), decompensated heart failure requiring intravenous diuretics/inotropes, or life-threatening arrhythmia
- **Significant Bleeding:** Blood loss necessitating ≥2 units packed RBC transfusion.
- **Length of Stay (LOS):** Days from surgery to discharge

Statistical Analysis: Data were entered into SPSS v25.0 (IBM Corp.). Continuous variables are presented as mean±standard deviation or median (interquartile range) based on normality (Shapiro-Wilk test). Categorical variables are summarized as counts and percentages. The primary outcome (major cardiac complication) was reported with exact Clopper-Pearson 95% confidence intervals. Comparisons between NYHA classes (I–II vs III) used Fisher's exact test for categorical outcomes and Mann-Whitney U test for LOS; two-sided $p<0.05$ was considered significant.

RESULTS AND DISCUSSION

This prospective series of 17 consecutive cases of women with congenital or acquired cardiac disease undergoing gynecologic procedures demonstrates a low incidence of major peri-operative cardiac events when managed with a structured multidisciplinary approach. The observed complication rate was 0%, yielding an upper 95% confidence limit of 18% using the Clopper-Pearson method[4]. While this upper bound appears wide, it mirrors early descriptive series Wei *et al*.[2] cohort of 23 patients also reported zero events, setting a precedent for exploratory safety data (Table 1).

Key peri-operative strategies included preoperative optimization of volume status and heart rate control, cautious anticoagulation management for prosthetic-valve patients and individualized anesthesia plans. For example, regional anesthesia was used in 35% of cases to minimize hemodynamic fluctuations and reduce exposure to general anesthetic agents, consistent with recommendations from the American College of Cardiology/American Heart Association guidelines on peri-operative cardiovascular evaluation[5]. Conversely, general anesthesia remained necessary for extensive procedures, with invasive monitoring (arterial line, central venous pressure) instituted for NYHA class III patients to guide fluid therapy and inotropic support (Table 2).

Length of Stay (LOS) was significantly longer in NYHA class III patients (median 6 vs 3 days, $p = 0.045$), highlighting the impact of limited functional reserve and more complex postoperative recovery. This finding aligns with prior data showing that higher NYHA class independently predicts prolonged hospitalization and increased resource utilization in noncardiac surgery[6]. Although, our series is underpowered for formal multivariable modeling, the trend underscores the need for intensified postoperative surveillance in higher-risk subgroups (Table 3).

Bleeding complications occurred in one patient (6%), comparable to reported rates of 0-9% in similar cohorts[7]. This patient had a mechanical mitral valve and required temporary interruption of warfarin, reinforcing the delicate balance between thrombosis and hemorrhage. Recent work suggests that bridging with low-molecular-weight heparin may mitigate risks, though evidence remains inconclusive (Table 4)[8].

Table 1: Demographic and Clinical Characteristics

Variable	Value (n = 17)
Age, mean±SD (years)	48.3±12.1
Parity, median (range)	2 (0-4)
BMI, mean±SD (kg/m²)	24.1±3.2
Socioeconomic status (low), n (%)	11 (65)
NYHA class III, n (%)	5 (29)
RHD, n (%)	8 (47)
IHD/CAD, n (%)	6 (35)
Prosthetic valve, n (%)	3 (18)
Diabetes mellitus, n (%)	4 (24)
Anticoagulated pre-op, n (%)	5 (29)

Table 2: Procedural Details

Procedure type	No.	Percentage
Total abdominal hysterectomy	7	41
Vaginal hysterectomy	4	24
Myomectomy/adnexal surgery	5	29
Diagnostic biopsy	1	6
Anaesthesia		
General	11	65
Regional	6	35

Table 3: Outcomes

Outcome	No.	Percentage	95% CI
Major cardiac complication	0	(0)	0-18%
Significant bleeding	1	(6)	0.2-28%
Median LOS, days (IQR)	4	(3-6)	-
30-day mortality	0	(0)	0-18%

Table 4: Comparisons by NYHA Class

Outcome	NYHA I-II (n = 12)	NYHA III (n = 5)	p-value
LOS, median (IQR)	3 (3-5)	6 (5-7)	0.045
Any complication, n (%)	1 (8)	0 (0)	1.000

Our study extends the literature by incorporating patients with diverse cardiac lesions rheumatic, degenerative, congenital and by employing contemporary imaging (transesophageal echocardiography) and monitoring techniques. Nevertheless, findings should be interpreted within context: as a single-center case series without a comparator arm, the observed safety profile reflects institutional expertise and protocols that may not generalize universally. The zero-event rate, while reassuring, may represent a type II error given the small sample; future multicenter registries could provide more precise estimates.

Moving forward, development of risk-stratification tools specific to gynecologic surgery could improve patient counseling and resource allocation. Incorporating biomarkers (e.g., NT-proBNP) and advanced imaging parameters may refine peri-operative risk prediction beyond traditional clinical metrics. Additionally, exploring long-term outcomes such as readmission rates and quality of life would add depth to short-term safety data.

CONCLUSION

In this prospective series of 17 consecutive women with congenital or acquired cardiac disease undergoing gynecologic procedures, no major cardiac events were observed, with an upper 95% confidence bound of 18%. Careful preoperative optimization, tailored anticoagulation protocols and multidisciplinary peri-operative management facilitated favorable outcomes. While sample size limits definitive risk quantification, our data support that routine gynecologic interventions can be safely performed in this population at experienced centers with structured protocols.

Limitations and Recommendations: Single-center design, small sample size, absence of a control group and potential selection bias toward healthier patients. Multicenter prospective registries to enhance event-rate precision; evaluation of bridging strategies for anticoagulation; development of surgery-specific risk calculators; inclusion of patient-reported outcomes and long-term follow-up for comprehensive safety profiling.

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